

# More perceptions Smarter control



**PROTRONIX**  
SENSE & EASY

- Based in 1996
- As Protronix Ltd. from 2001
- Custom-made design and production of industrial electronics
- Test series production to batch production
- Wide experience in air quality sensors, in industrial electronics especially for ventilation units, HVAC, DCV system, systems with reverse heating recovery

# Product Overview

- Air quality sensors-
- CO2, VOC, RH, T
- Differential pressure sensors
- Ambient light sensors
- DCV control units
- HVAC control units
- Temperature controllers
- Control units for saunas



# WHY Indoor Air Quality Sensors?



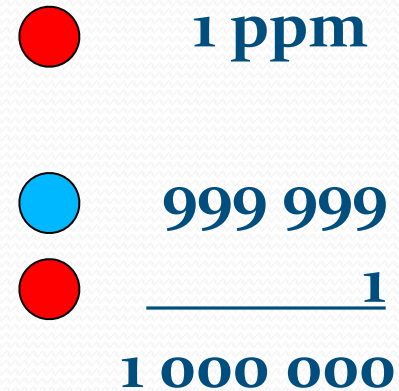
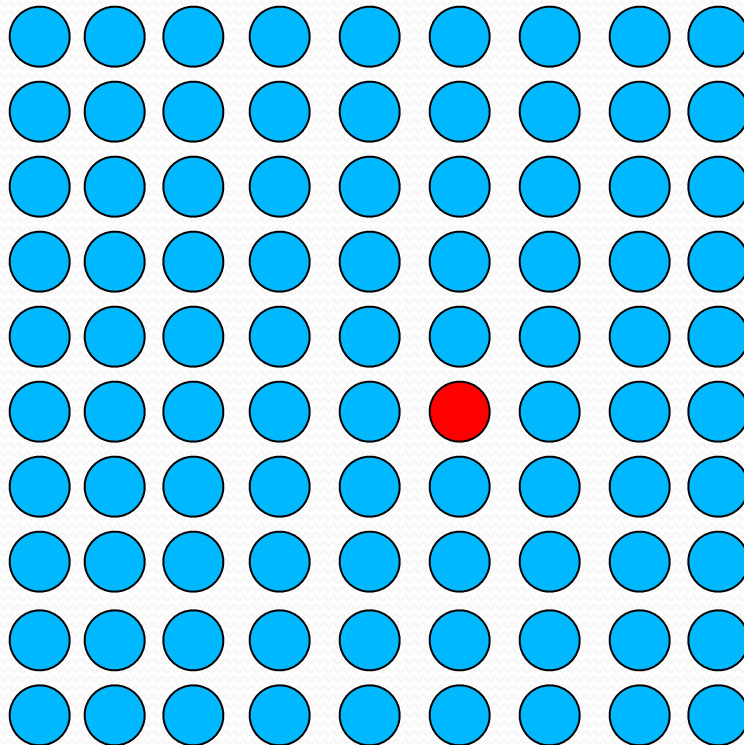
- On average we inhale 15 kg of air per day
- 80% of which is indoors
- SBS – Sick Building Syndrome

# What are typical indoor contaminants

- VOC - Volatile Organic Compounds
  - Acetone, Ethanol, Isoprene, Butan.....
  - .....up to 10 000 different VOCs
- Humidity
- Carbon Dioxide - CO<sub>2</sub>
- Carbon Monoxide - CO

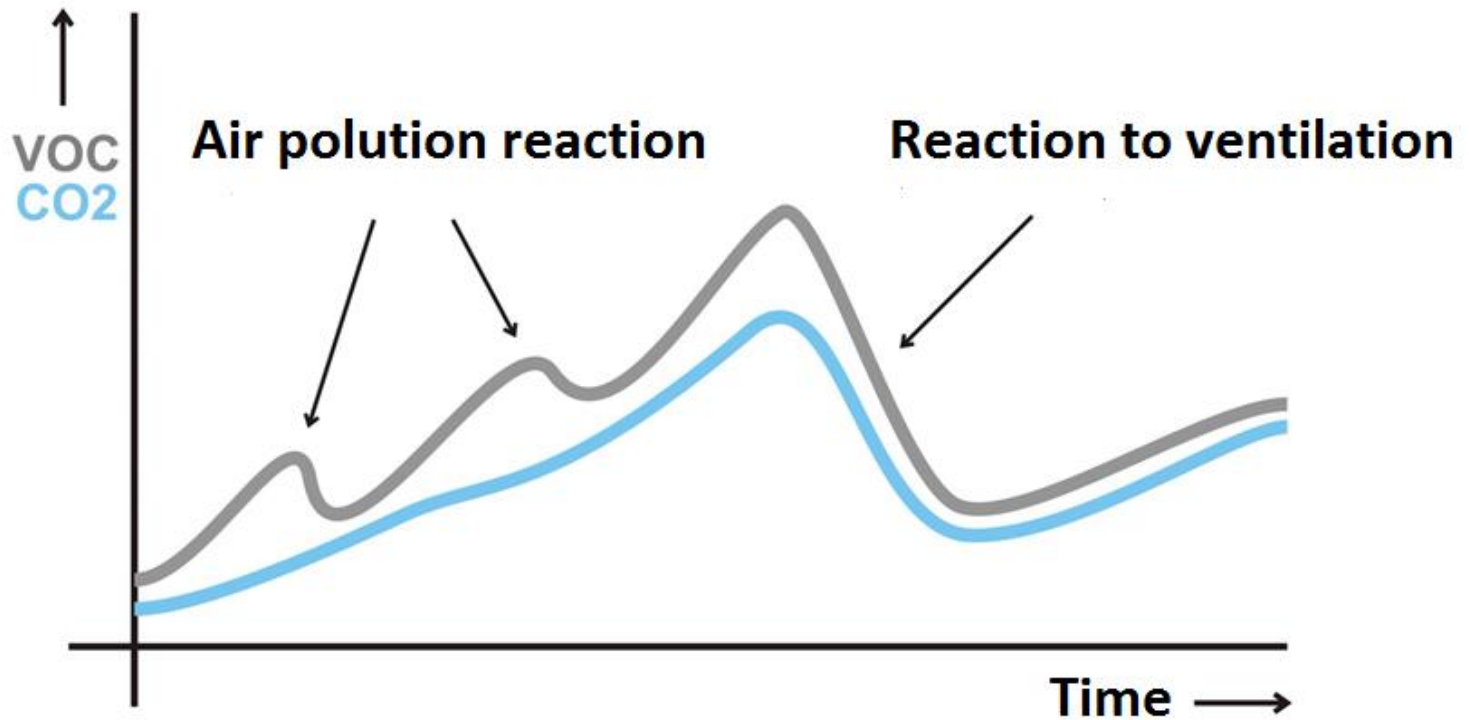
Indoor Air	Typical Substances			
Contamination Source	VOC	CO	Humidity	CO <sub>2</sub>
Human Beings- Breathing	✓		✓	✓
Combustion, cooking, technology processes	✓	✓	✓	✓
Smoking	✓	✓		✓
Paints, Solvents, Detergents	✓		✓	
Building Materials, Furniture	✓		✓	

# ppm – Parts Per Million



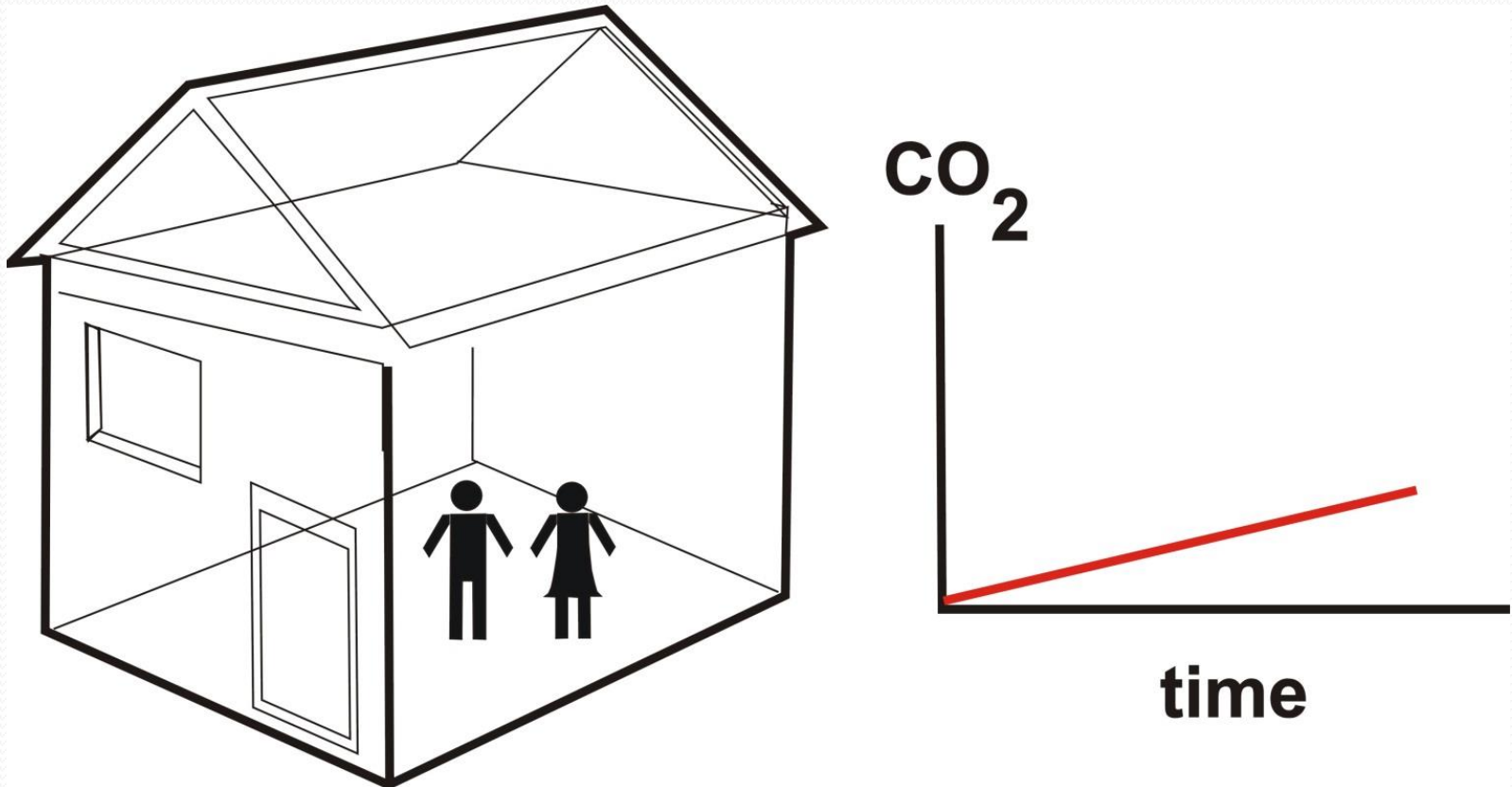
parts per million  
 $1 / 1\ 000\ 000$



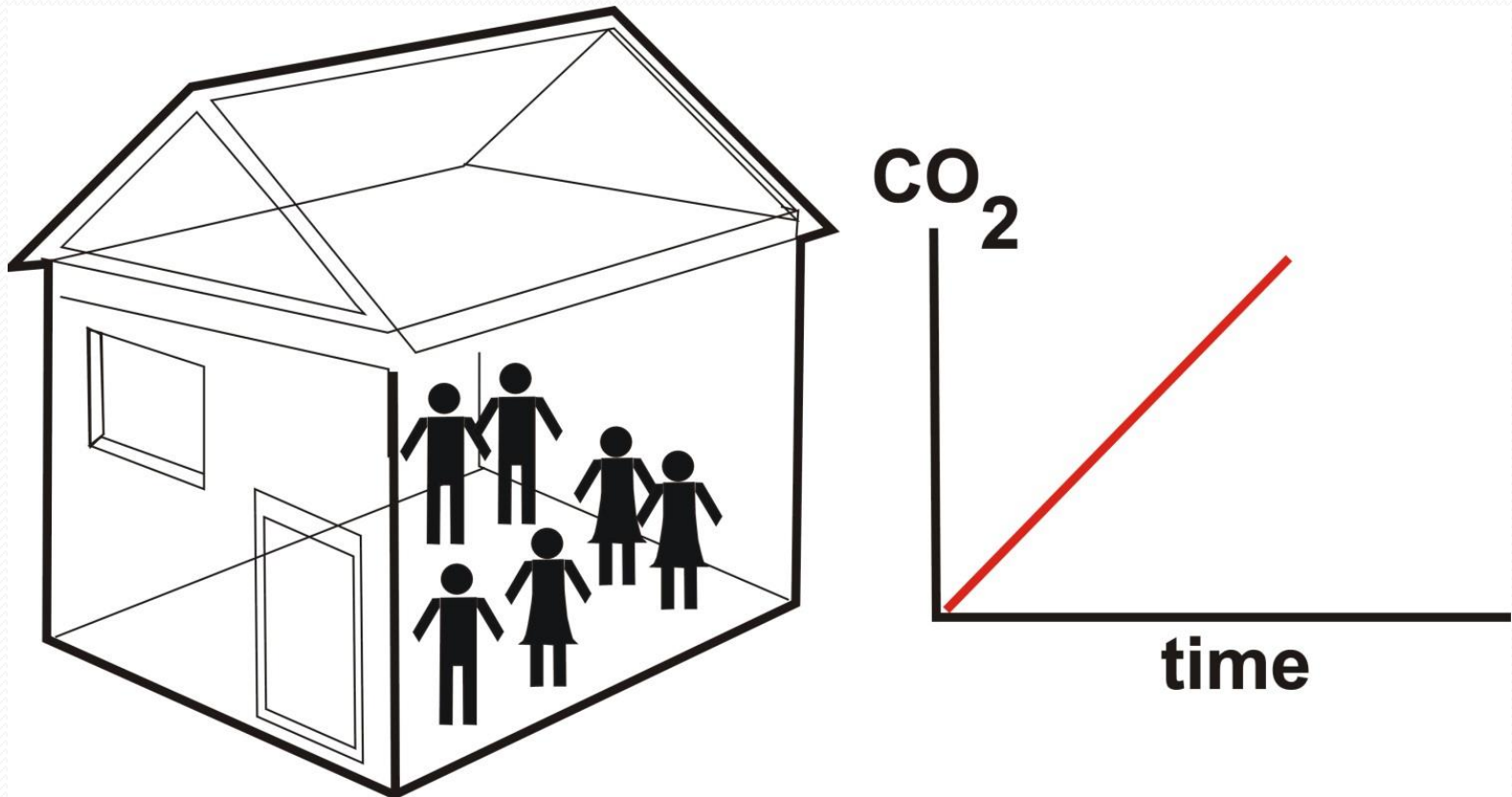




# CO<sub>2</sub> generation



# CO<sub>2</sub> generation



# CO<sub>2</sub> concentration scale

<b>5 000 ppm</b>	<b>Maximum hygienic limit</b>
2 000 – 5 000 ppm	Drowsiness, Fatigue, Headache
1 000 – 2 000 ppm	Uncomfortable, lower concentration
<b>800 – 1 000 ppm</b>	<b>Recommended value indoor</b>
400 – 600 ppm	Wasting of energy using ventilation
350 – 450 ppm	Outdoor environment

# What is manifestation of poor indoor air quality?

**High CO<sub>2</sub> concentration**

**= high concentration of contaminants**



# Poor concentration



# Low effectivity of meetings



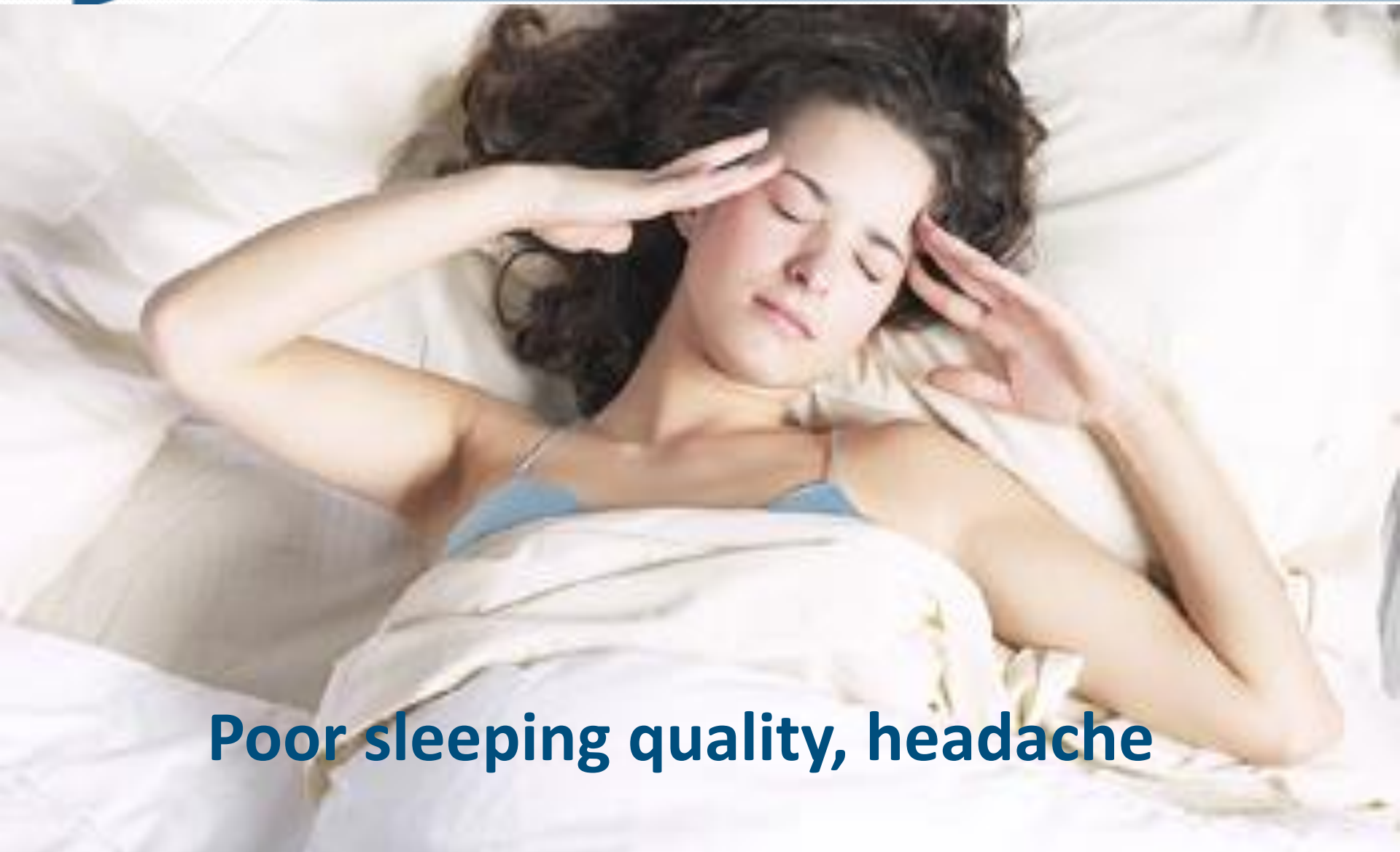


# Drowsiness Fatigue



A young boy is sleeping in a theater seat, leaning back with his eyes closed and mouth open. He is holding a large blue and white striped bag of popcorn. The theater seats are red with wooden armrests, and the background shows rows of empty seats.

# Sleepiness



**Poor sleeping quality, headache**

# New Design of Air Quality Sensors





- CO<sub>2</sub>
- VOC
- RH
- IQRF wireless RS485 serial communication





CO<sub>2</sub> / humidity sensor



VOC / relative humidity sensor



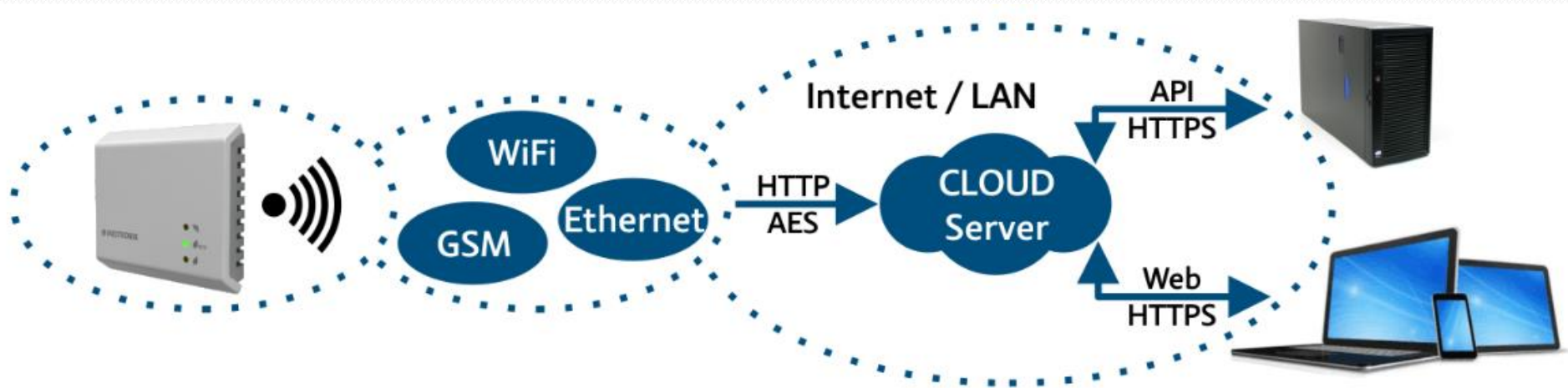


Relative humidity / temperature sensor





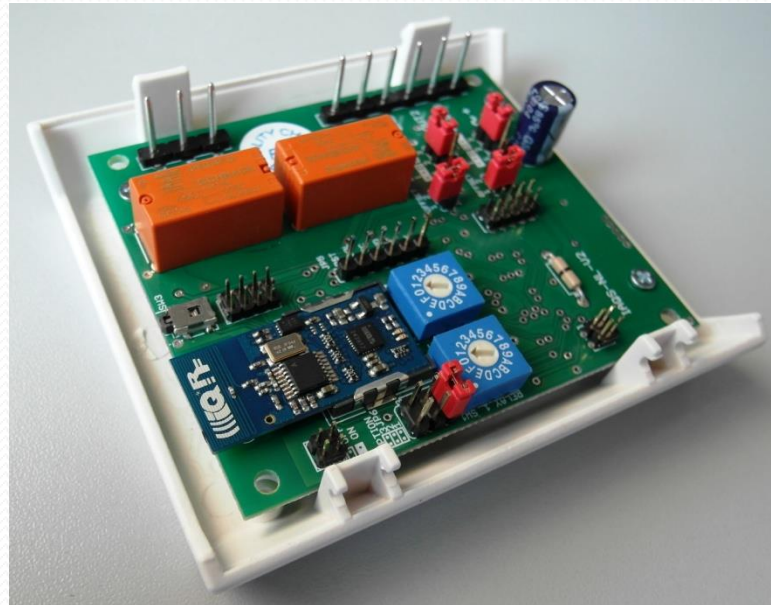
## Complete solution for CO<sub>2</sub>, humidity and temperature sensor data collection and visualization on the IQRF Cloud.



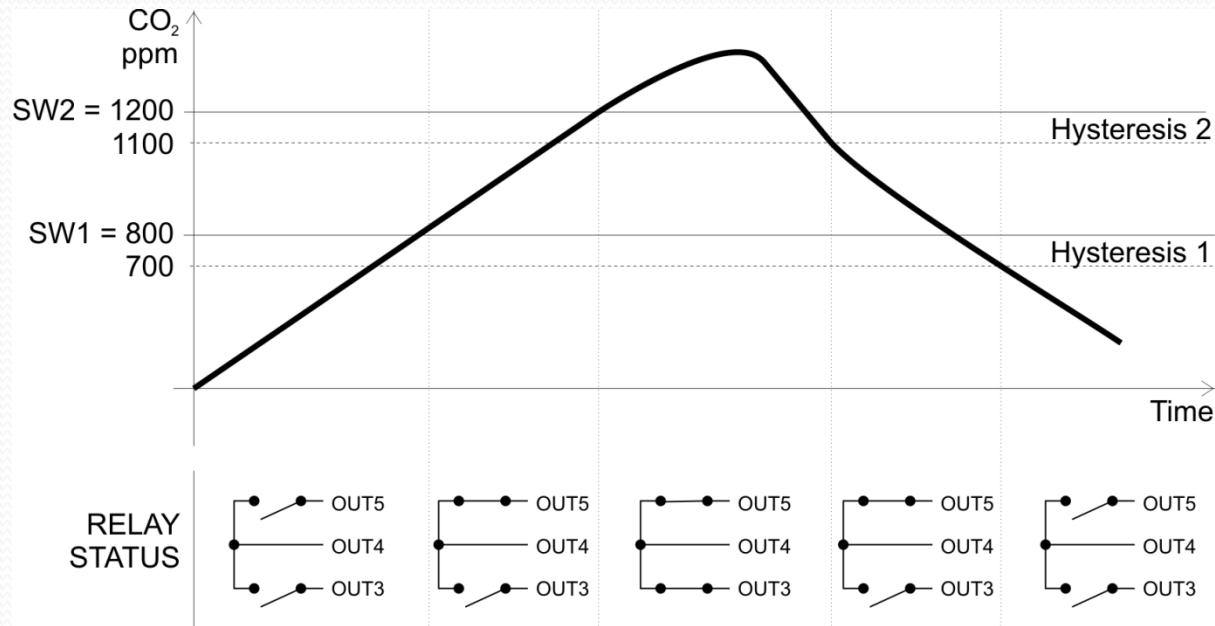
The integration of the IQRF Technology into the CO<sub>2</sub> sensor, connection to the IQRF Cloud through a plug-and-play GSM or ETH gateway from MICRORISC and customization of the IQRF Cloud



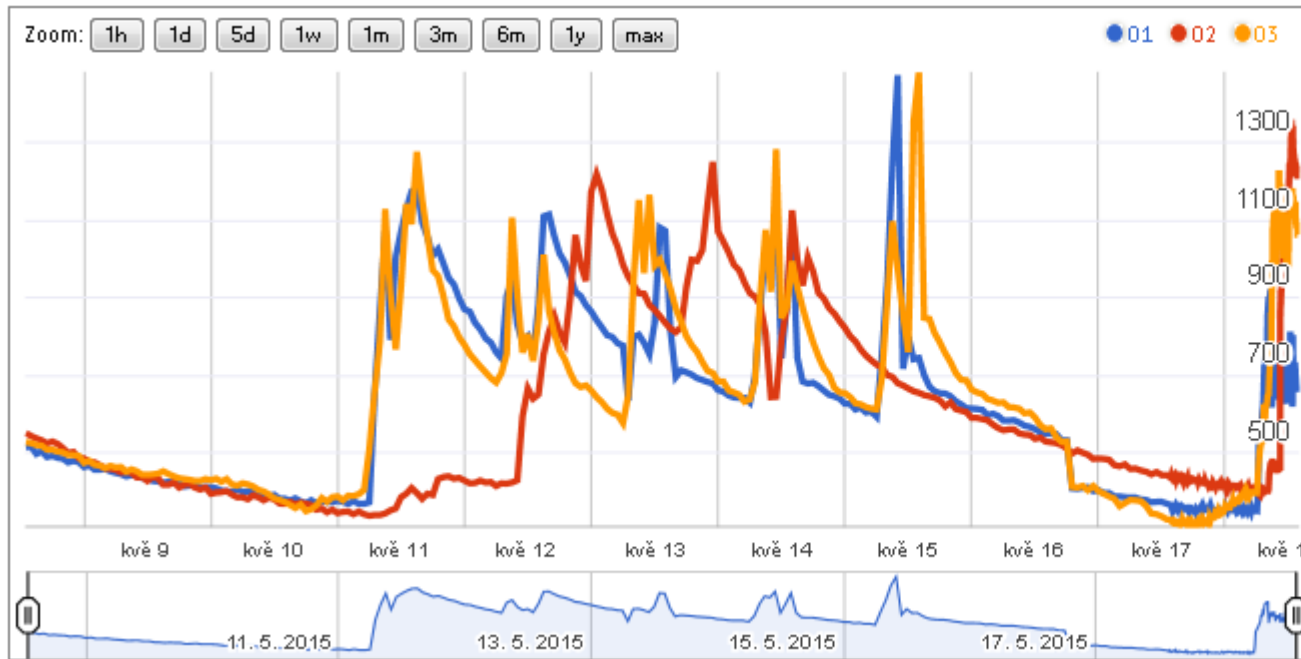
- An IQRF DCTR-72DA module connected to the CO<sub>2</sub> detector with a SIM-card holder
- The UART used as the communication interface



# Cascade switching – two relays (NLII-CO2-2R)



# CO<sub>2</sub> measurement chart



Aktuální hodnoty:

**Výroba**

**671** ppm

**Laboratoř SW**

**1225** ppm

**Účtárna**

**1064** ppm

# Differential Pressure Sensor

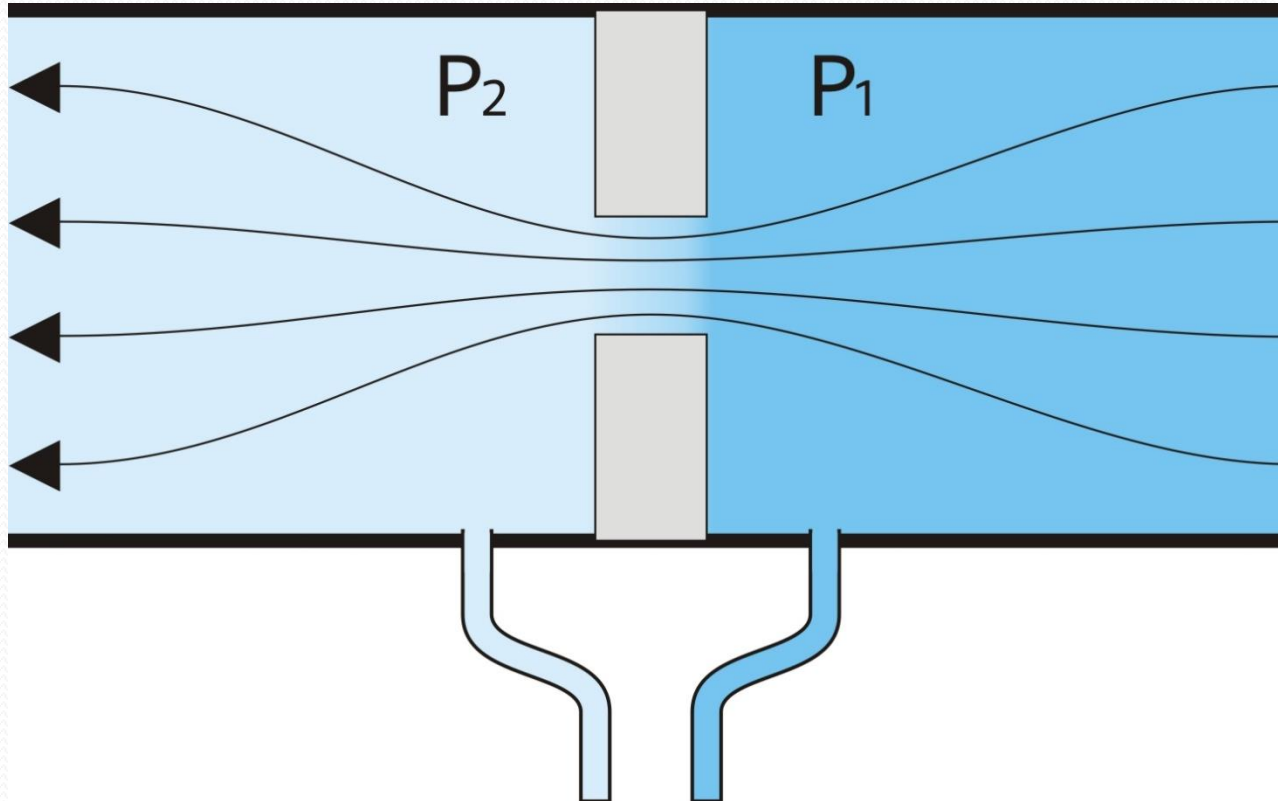


## Main Features

- Range -250 to +250 Pa
- Range -500 to +500 Pa
- Range -1250 to +1250 Pa
- Accuracy max. +/- 2% of FS
- Operating temperature range -20°C to + 60°C
- IP 65 according to EN60529



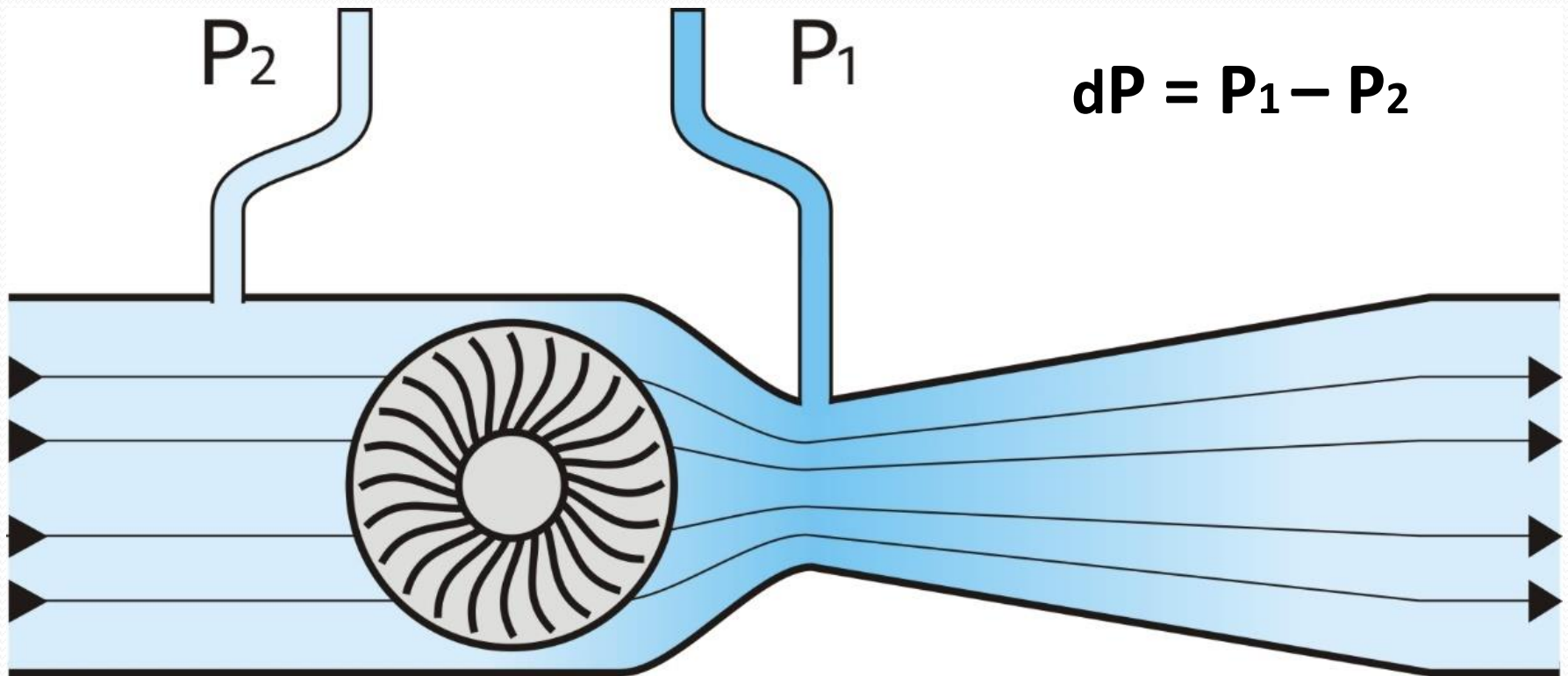
# Air Flow monitoring in duct



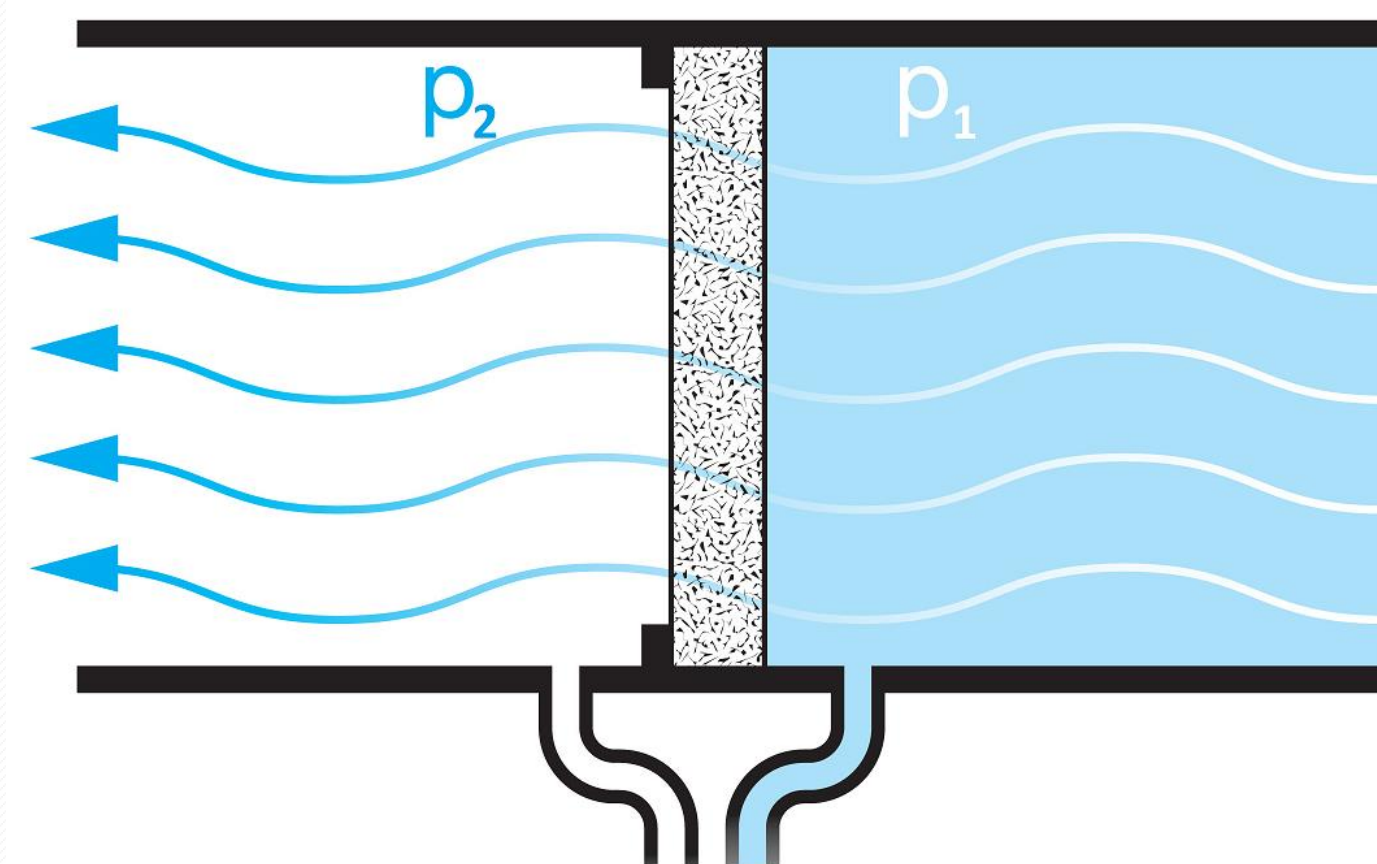
$$dP = P_1 - P_2$$



# Air Flow calculation directly on fans cervix

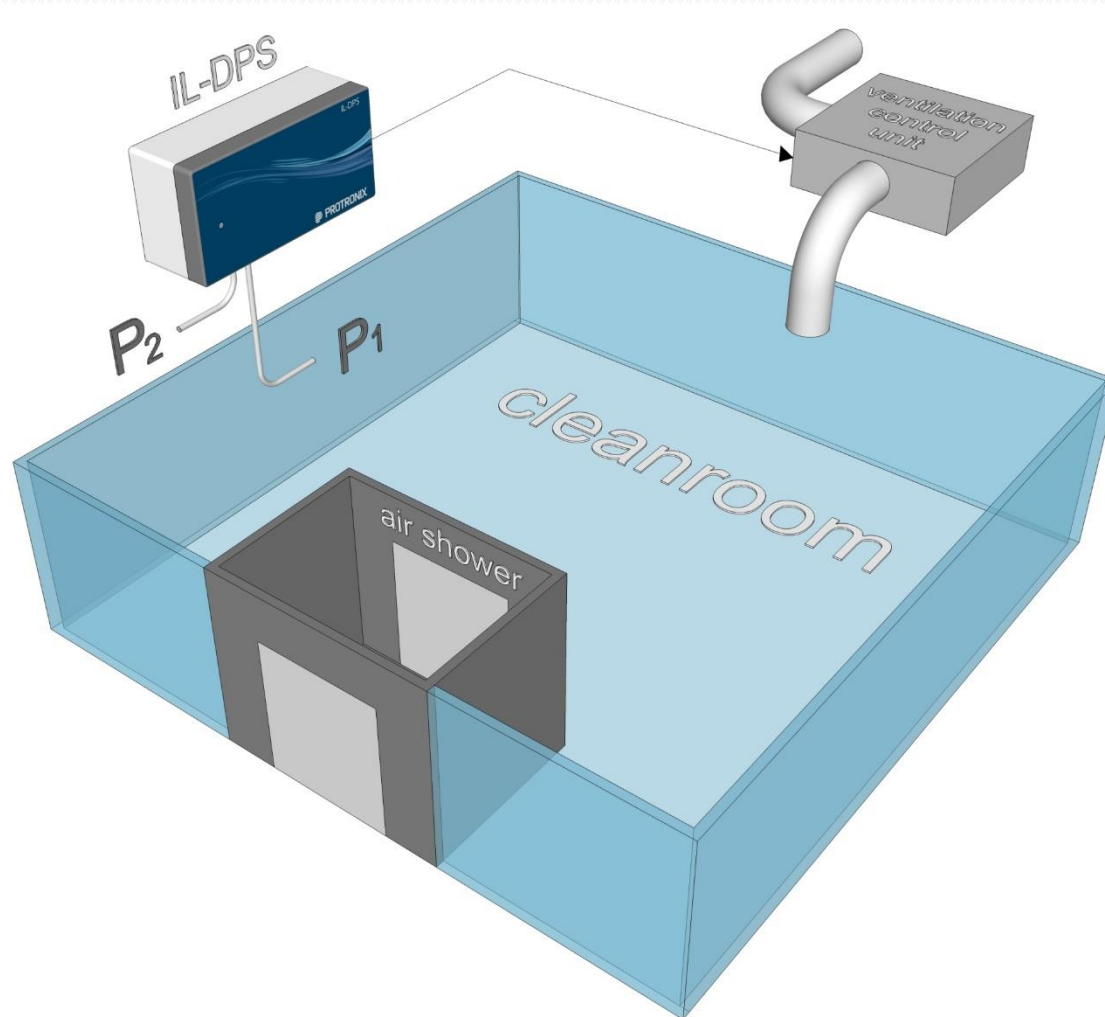


# Air Filter clogging monitoring



$$dP = P_1 - P_2$$

# Overpressure monitoring in cleanrooms



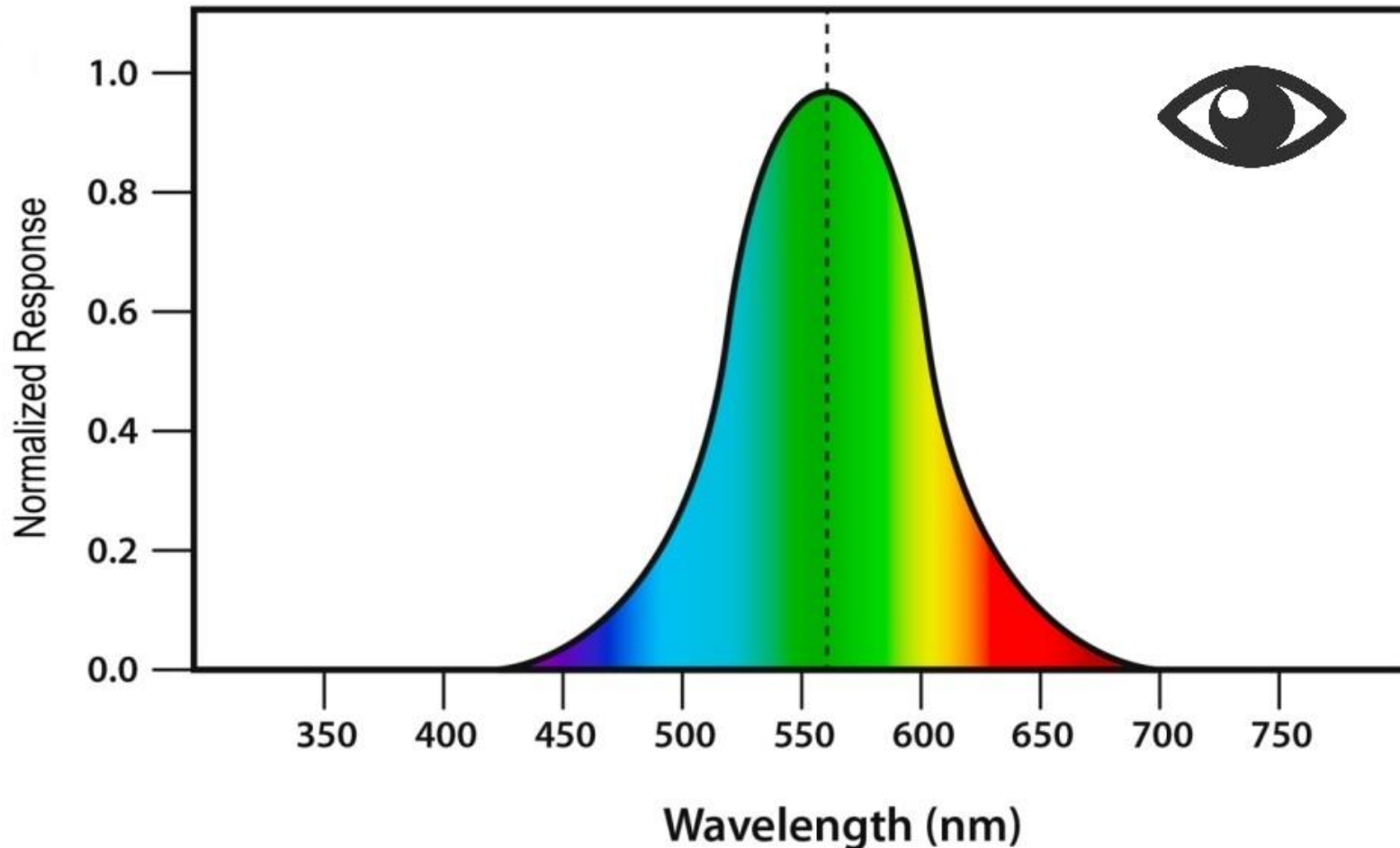
# Ambient Light Sensor

## Main Features

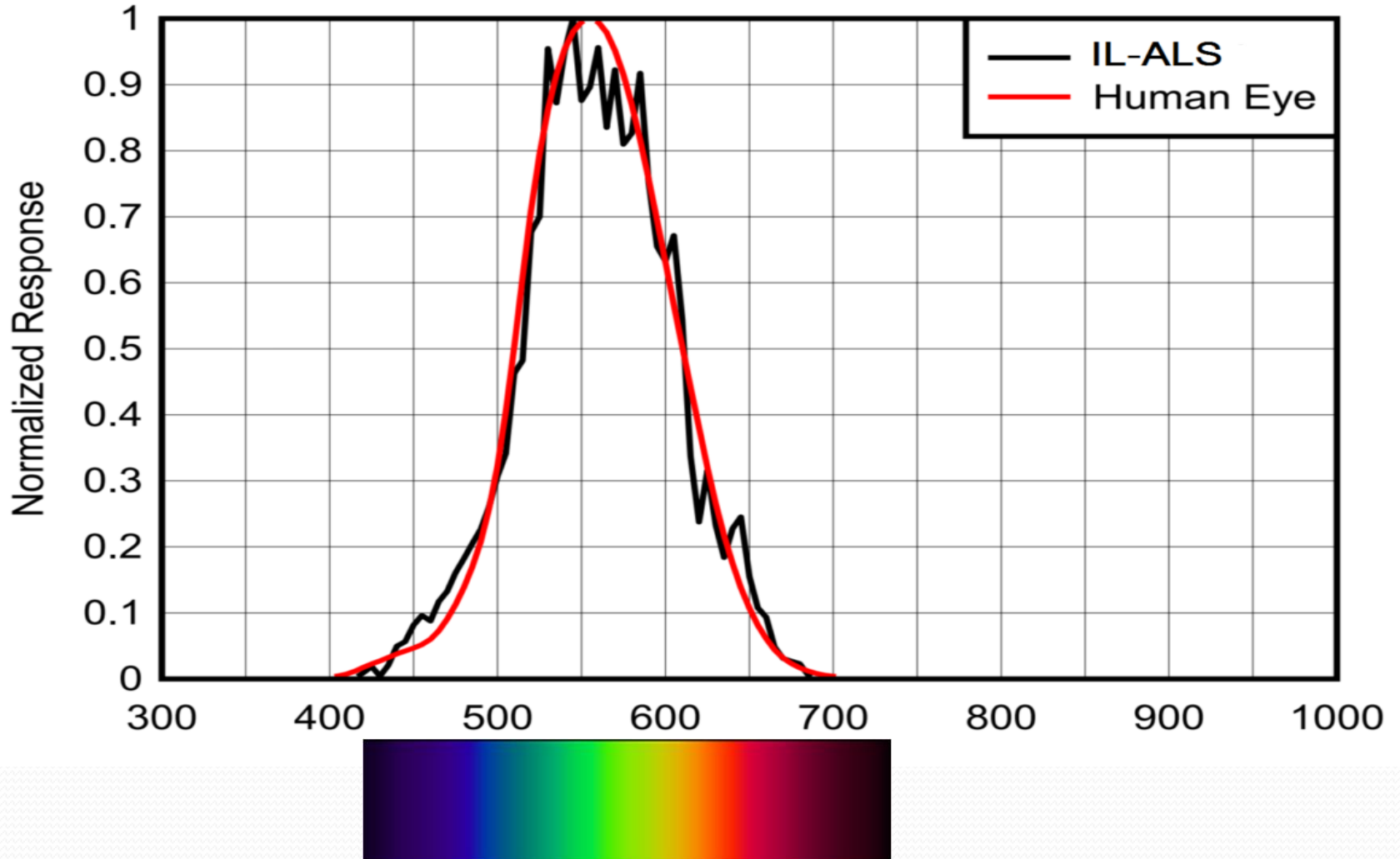
- Precision Human Eye Response
- Visible light sensing only
- Measuring range 0- 80 000 lux
- Operating temperature  
-30°C to +60°C / max. RH 95%
- IP 65 according to EN60529
- MODBUS communication  
protocol
- **IQRF wireless module**
- RS485 serial communication



# Human eye light sensitivity

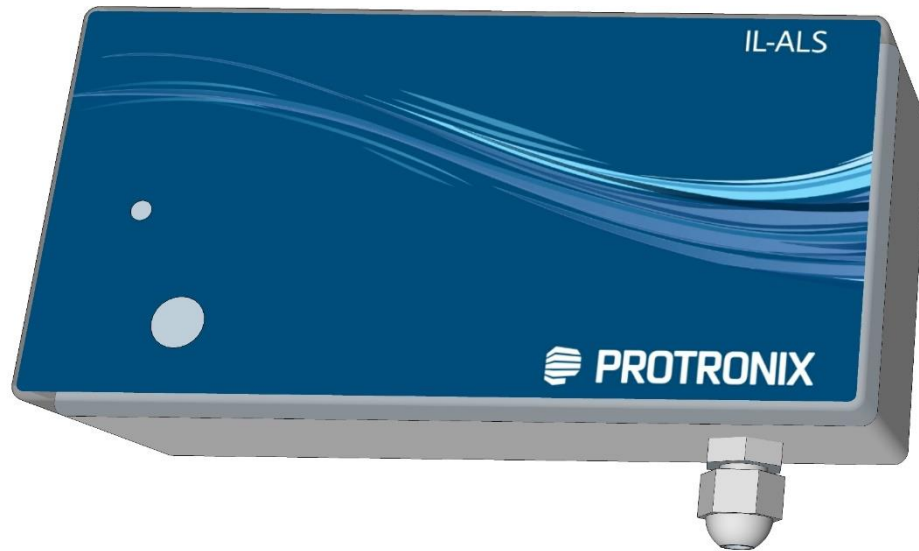


# IL-ALS sensitivity



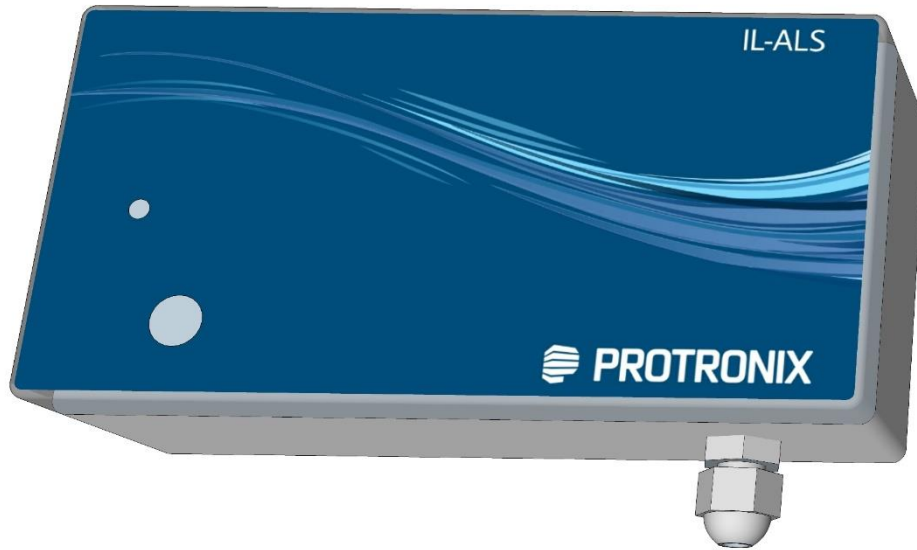


# Monitoring day light for street light control

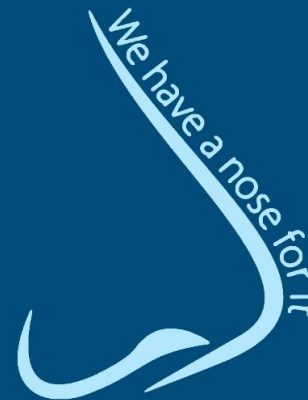




# Industrial lighting monitoring



# Thank you for your time.



[www.careforair.eu](http://www.careforair.eu)